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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,693	02/26/2004	Devlin M. Gualtieri	H0005039-1180	9361

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EXAMINER	
CHERRY, STEPHEN J	

ART UNIT	PAPER NUMBER
2863	

DATE MAILED: 12/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/789,693	GUALTIERI, DEVLIN M.	
	Examiner	Art Unit	
	Stephen J. Cherry	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) *32* is/are withdrawn from consideration.

5)☒ Claim(s) *13-19* is/are allowed.

6)☐ Claim(s) *1-12 and 20-30* is/are rejected.

7)☐ Claim(s) *31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8-5-05 and 2-26-04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Claim 32 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 10-28-2005.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 7-8, and 28-30 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 6,505,509 to Gualtieri.

Claim 1 recites, as disclosed by Gualtieri:

> 1. A position sensing system, comprising:
>
> a variable frequency signal source coupled to receive a frequency control signal and operable, in response thereto, to supply a sensor drive signal at a frequency ('509, fig. 13, ref. 1310);
>
> a transmission line sensor having one or more resonant frequencies, the transmission line sensor including a sensor conductor and a moveable dielectric at least partially surrounding the sensor conductor, the sensor conductor having a driven end coupled to receive the sensor drive signal

and a terminal end configured to reflect the sensor drive signal to thereby supply a reflected signal to the driven end, the moveable dielectric configured to receive a drive force and, upon receipt thereof, to move the dielectric to a position and thereby vary the one or more resonant frequencies of the transmission sensor ('509, fig. 5, ref. 501, and col. 4, line 61);

a summing circuit coupled to receive the sensor drive signal and the reflected signal and operable, in response thereto, to supply a standing wave signal having an amplitude that varies with the one or more resonant frequencies of the transmission line sensor ('509, fig. 13, ref. 1320-1322);

a control circuit coupled to receive the standing wave signal and operable, in response thereto, to (i) determine the sensor drive signal frequency relative to at least one of the transmission line sensor resonant frequencies and (ii) supply the frequency control signal to the variable frequency source, to thereby adjust the sensor drive signal frequency to substantially match at least one of the transmission line sensor resonant frequencies ('509, fig. 13, col. 6, line 22); and

a position determination circuit coupled to receive the adjusted sensor drive signal and operable, in response thereto, to determine the position of the moveable dielectric relative to the sensor conductor ('509, fig. 13, ref. 1310).

Claim 2 recites, as disclosed by Gualtieri:

2. The system of Claim 1, wherein the variable frequency signal source comprises a voltage controlled oscillator circuit ('509, fig. 13, ref. 1301).

Claim 3 recites, as disclosed by Gualtieri:

3. The system of Claim 1, wherein the control circuit comprises a lock-in amplifier circuit ('509, fig. 13, col. 6, line 22).

Claim 4 recites, as disclosed by Gualtieri:

4. The system of Claim 1, wherein the control circuit determines the sensor drive signal frequency relative to at least one of the transmission line sensor resonant frequencies by determining a derivative of the standing wave signal amplitude with respect to the sensor drive signal frequency ('509, fig. 13, col. 6, line 22).

Claim 5 recites, as disclosed by Gualtieri:

5. The system of Claim 1, further comprising:

a fixed-frequency signal source operable to supply a fixed-frequency modulation signal, wherein the variable frequency source is further coupled to receive the fixed-frequency modulation signal and is further operable, in response thereto, to frequency modulate the sensor drive signal based on the fixed-frequency modulation signal ('509, fig. 13, ref. 1307, and col. 6, line 22).

Claim 7 recites, as disclosed by Gualtieri:

7. The system of Claim 1, wherein the summing circuit comprises: a first resistor coupled between the sensor conductor and the variable frequency signal source ('509, fig. 13, ref. 1320); a second resistor coupled between the sensor conductor and the control circuit ('509, fig. 13, ref. 1322); and a third resistor coupled between the sensor conductor and a circuit common ('509, fig. 13, ref. 1321).

Claim 8 recites, as disclosed by Gualtieri:

8. The system of Claim 1, wherein the position determination circuit comprises:

a frequency to voltage converter circuit coupled to receive the adjusted sensor drive signal and operable, in response thereto, to supply a DC signal having a voltage magnitude proportional to the position of the moveable dielectric ('509, fig. 13, ref. 1310).

Claim 28 recites, as disclosed by Gualtieri:

28. A method of determining a position of moveable component, comprising the steps of:

moving a dielectric in response to movement of the moveable component, the dielectric disposed within a resonant transmission line adjacent a sensor conductor, whereby movement of the dielectric varies an impedance and a resonant frequency of the resonant transmission line ('509, fig. 5, ref. 501, and col. 4, line 61);

supplying a sensor drive signal to the resonant transmission line conductor, to thereby produce a reflected signal, the sensor drive signal having a frequency ('509, fig. 13, ref. 1310);

summing the sensor drive signal and the reflected signal to produce a standing wave signal ('509, fig. 13, ref. 1320-1322);

determining the sensor drive signal frequency relative to a resonant frequency of the transmission line ('509, fig. 13, col. 6, line 22);

adjusting the sensor drive signal frequency to substantially match a resonant frequency of the transmission line ('509, fig. 13, col. 6, line 22); and determining the position of the moveable component based at least in part on the adjusted sensor drive signal frequency ('509, fig. 13, ref. 1310).

Claim 29 recites, as disclosed by Gualtieri:

29. The method of Claim 28, wherein the reflected signal has at least an amplitude, and wherein the step of determining the sensor drive signal frequency relative to a resonant frequency of the transmission line comprises:

determining a first derivative of the reflected signal amplitude with respect to the sensor drive signal frequency ('509, fig. 13, col. 6, line 22).

Claim 30 recites, as disclosed by Gualtieri:

30. The method of Claim 28, further comprising:

frequency modulating the sensor drive signal based on a modulation signal having a modulation frequency and phase ('509, fig. 13, ref. 1307, and col. 6, line 22);

detecting a phase of the reflected signal relative to the phase of the modulation signal ('509, fig. 13, ref 1305); and

determining the sensor drive signal frequency relative to the resonant frequency of the transmission line based on the relative phases of the reflected signal and the modulation signal ('509, col. 6, line 22).

Claims 20-25 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,376,888 to Hook.

Claim 20 recites, as disclosed by Hook:

20. A resonant transmission line sensor, comprising:

a first conductive substrate ('888, fig. 10, ref. 96);

a second conductive substrate ('888, fig. 10, ref. 98);

a sensor substrate having at least a first and second surface, the sensor substrate disposed between the first and second conductive substrates ('888, col. 16, line 17);

a sensor conductor coupled to the sensor substrate first surface ('888, fig. 10, 95); and

a movable dielectric disposed between the first conductive substrate and

the sensor conductor, the moveable dielectric configured to receive a drive force and, upon receipt thereof, to move relative to the sensor conductor ('888, fig. 30, ref. 162).

Claim 21 recites, as disclosed by Hook:

21. The sensor of Claim 20, wherein the sensor conductor is formed into a serpentine pattern on the sensor substrate first surface ('888, fig. 30).

Claim 22 recites, as disclosed by Hook:

22. The sensor of Claim 20, further comprising: a dielectric coating covering at least a portion of the sensor dielectric substrate and at least a portion of the sensor conductor (888, fig. 26 and 27, and col. 16, line 10-51).

Claim 23 recites, as disclosed by Hook:

23. The sensor of Claim 20, wherein the moveable dielectric comprises:

a first moveable dielectric substrate disposed between the first conductive substrate and the sensor conductor ('888 fig. 30, ref. 162); and

a second moveable dielectric substrate coupled to the first moveable dielectric substrate and disposed between the second conductive substrate and the sensor substrate second surface ('888 fig. 30, ref. 162).

Claim 24 recites, as disclosed by Hook:

24. The system of Claim 20, further comprising:

a dielectric coating covering at least portions of the sensor dielectric substrate, the sensor conductor, the first moveable dielectric substrate, and the second dielectric substrate ('888, figs. 26-27, and col. 16, line 10-51).

Claim 25 recites, as disclosed by Hook:

25. The system of Claim 20, wherein the sensor substrate comprises a dielectric a sensor substrate having at least a first and second surface, the sensor

substrate disposed between the first and second conductive substrates ('888, col. 16, line 17).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 6, and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6505,509 to Gualtieri in view of U.S. Patent 5,376,888 to Hook.

The claims recite, as disclosed by Gualtieri:

a variable frequency signal source coupled to receive a frequency control signal and operable, in response thereto, to supply a sensor drive signal at a frequency ('509, fig. 13, ref. 1310);

a transmission line sensor having one or more resonant frequencies, the transmission line sensor including a sensor conductor and a moveable dielectric at least partially surrounding the sensor conductor, the sensor conductor having a driven end coupled to receive the sensor drive signal and a terminal end configured to reflect the sensor drive signal to thereby supply a reflected signal to the driven end, the moveable dielectric configured to receive a drive force and, upon receipt thereof, to move the dielectric to a position and thereby vary the one or more resonant frequencies of the transmission sensor ('509, fig. 5, ref. 501, and col. 4, line 61);

a summing circuit coupled to receive the sensor drive signal and the reflected signal and operable, in response thereto, to supply a standing wave signal having an amplitude that varies with the one or more resonant frequencies of the transmission line sensor ('509, fig. 13, ref. 1320-1322);

a control circuit coupled to receive the standing wave signal and operable, in response thereto, to (i) determine the sensor drive signal frequency relative to at least one of the transmission line sensor resonant frequencies and (ii) supply the frequency control signal to the variable frequency source, to thereby adjust the sensor drive signal frequency to substantially match at least one of the transmission line sensor resonant frequencies ('509, fig. 13, col. 6, line 22); and

a position determination circuit coupled to receive the adjusted sensor drive signal and operable, in response thereto, to determine the position of the moveable dielectric relative to the sensor conductor ('509, fig. 13, ref. 1310).

However, Gualtierei does not disclose the use of a particular stripline sensor.

The claims further recite, as disclosed by Hook:

wherein the resonant transmission line sensor is configured as an embedded stripline resonant transmission line ('888, fig. 26-27 and col. 16, line 17)

wherein the resonant transmission line sensor comprises:

first and second conductive substrates ('888, fig. 10, ref. 96 and 98); and

a fixed dielectric substrate having at least a first surface and a second surface, the sensor conductor coupled to at least one of the first and second surfaces ('888, col. 16, line 17),

wherein the moveable dielectric includes: -

a first moveable dielectric substrate disposed between the first conductive substrate and the fixed dielectric substrate first surface ('888 fig. 30, ref. 162),

a second moveable dielectric substrate disposed between the second conductive substrate and the fixed dielectric substrate second surface ('888 fig. 30, ref. 162).

a dielectric coating covering at least a portion of the fixed dielectric substrate and at least a portion of the sensor conductor ('888, figs. 26-27, and col. 16, line 10-51).

a dielectric coating covering at least portions of the fixed dielectric substrate, the sensor conductor, the first moveable dielectric substrate, and the second dielectric substrate ('888, figs. 26-27, and col. 16, line 10-51).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the sensor of Hook with the invention of Gualtieri to allow the sensing of soil levels automatically through electronic processing ('888, col. 1, line 8).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6505,509 to Gualtieri in view of U.S. Patent 5,376,888 to Hook as applied to claims 1 and 9 above, and further in view of U.S. Patent 5,497,098 to Heil et al.

Gualtieri or Hook do not disclose alumina as a dielectric substrate.

The claim further recites substrates comprising alumina, as disclosed by Heil ('098, col. 6, line 46).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made combine the sensor of Hook with the invention of Gualtieri with an alumina dielectric because of it's low dielectric constant ('098, col. 6, line 48).

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,376,888 to Hook in view of U.S. Patent 5,497,098 to Heil.

The claims recite, as disclosed by Hook:

a first conductive substrate ('888, fig. 10, ref. 96);

a second conductive substrate ('888, fig. 10, ref. 98);

a sensor substrate having at least a first and second surface, the sensor substrate disposed between the first and second conductive substrates ('888, col. 16, line 17);

a sensor conductor coupled to the sensor substrate first surface ('888, fig. 10, 95); and a movable dielectric disposed between the first conductive substrate and the sensor conductor, the moveable dielectric configured to receive a drive force and, upon receipt thereof, to move relative to the sensor conductor ('888, fig. 30, ref. 162).

wherein the sensor substrate comprises a

dielectric a sensor substrate having at least a first and second surface, the sensor substrate disposed between the first and second conductive substrates ('888, col. 16, line 17).

However, Hook does not disclose alumina as a dielectric.

The claim further recites substrates comprising alumina, as disclosed by Heil ('098, col. 6, line 46).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made combine the sensor of Hook with an alumina dielectric because of it's low dielectric constant ('098, col. 6, line 48).

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,376,888 to Hook in view of Sears, "University Physics".

a first conductive substrate ('888, fig. 10, ref. 96);

a second conductive substrate ('888, fig. 10, ref. 98);

a sensor substrate having at least a first and second surface, the sensor substrate disposed between the first and second conductive substrates ('888, col. 16, line 17);

a sensor conductor coupled to the sensor substrate first surface ('888, fig. 10, 95); and

a movable dielectric disposed between the first conductive substrate and the sensor conductor, the moveable dielectric configured to receive a drive force and, upon receipt thereof, to move relative to the sensor conductor ('888, fig. 30, ref. 162).

Hook does not disclose silver as a conductor.

The claim further recites conductors comprising silver, as disclosed by Sears (Table 28-1)

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the sensor of Hook with the silver conductor of Sears because of it's low resisivity.

Allowable Subject Matter

Claims 13-19 are allowed.

The following is an examiner's statement of reasons for allowance:

The independent claim 13 recites, "a reference position determination circuit coupled to receive the adjusted reference sensor drive signal and operable, in response thereto, to determine the position of the moveable dielectric relative to the reference conductor and supply a signal representative thereof, and a temperature compensation circuit coupled to receive the signal representative of the position of the moveable dielectric relative to the sensor conductor and the signal representative of the moveable dielectric relative to the reference conductor and operable, in response thereto, to supply a temperature compensated position signal representative of the position of the moveable dielectric relative to the sensor conductor". This feature in combination with the remaining claimed structure avoids the prior art of record.

The independent claim 17 recites, "sensor and reference transmission line sensors, respectively, and (ii) supply the sensor and reference frequency control signals to the sensor and reference variable frequency sources, respectively, to thereby adjust the sensor and reference drive signal frequencies to substantially match at least one sensor and at least one reference resonant frequency, respectively, of the differential

transmission line sensor; a sensor and a reference relative position determination circuit, the sensor and reference position determination circuits each coupled to receive the adjusted sensor and reference drive signals, respectively, and operable, in response thereto, to supply a sensor and reference relative position signal, respectively, representative of moveable dielectric position relative to the sensor and reference conductor, respectively". This feature in combination with the remaining claimed structure avoids the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Claim 31 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claim 31 recites, "determining the reference sensor drive signal frequency relative to a resonant frequency of the resonant transmission line reference section; adjusting the reference sensor drive signal frequency to substantially match a resonant frequency of the resonant transmission line reference section; and determining the position of the moveable component based at least in part on the adjusted sensor drive

signal frequency and the adjusted reference sensor drive signal frequency". This feature in combination with the remaining claimed structure avoids the prior art of record.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Cherry whose telephone number is (571) 272-2272. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SJC

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